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USATHAMA

U.S. Army Toxic and Hazardous Materials Agency
Report of Sampling and
Analysis Results

Irwin Army Housing Units
Irwin, Pennsylvania

August 1990

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**SAMPLING AND ANALYSIS AT THE U.S. ARMY
FAMILY HOUSING UNIT (FHU) PROPERTY
IRWIN, PENNSYLVANIA**

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	ii
SECTION 1. INTRODUCTION	1
1.1 PURPOSE AND SCOPE	1
1.2 SITE DESCRIPTION	1
1.3 REPORT ORGANIZATION	2
SECTION 2. ASBESTOS-CONTAINING MATERIALS	3
2.1 SAMPLING RATIONALE	3
2.2 FIELD ACTIVITIES AND OBSERVATIONS	3
2.3 LABORATORY PROCEDURES AND RESULTS	5
2.4 CONCLUSIONS AND RECOMMENDATIONS	11
SECTION 3. AIRBORNE ASBESTOS ASSESSMENT	14
3.1 SAMPLING RATIONALE	14
3.2 FIELD ACTIVITIES AND OBSERVATIONS	14
3.3 LABORATORY PROCEDURES AND RESULTS	15
3.4 CONCLUSIONS AND RECOMMENDATIONS	16
SECTION 4. SUMMARY OF FINDINGS	18

LIST OF TABLES

TABLE 2.1 BULK SAMPLE SUMMARY, IRWIN FAMILY HOUSING	7
TABLE 2.2 ASBESTOS CONTAINING MATERIALS, IRWIN FAMILY HOUSING.	9
TABLE 3.1 RESULTS OF AIRBORNE ASBESTOS SAMPLING AND ANALYSIS, IRWIN, PENNSYLVANIA FAMILY HOUSING UNITS ...	17

LIST OF APPENDICES

APPENDIX A. ASBESTOS SUPPORTING DATA	
A.1 FIELD DATA, ASBESTOS SAMPLING	
A.2 LABORATORY DATA, ASBESTOS SAMPLES	
APPENDIX B. AIRBORNE ASBESTOS SUPPORTING DATA	
B.1 FIELD DATA, AIRBORNE ASBESTOS SAMPLING	
B.2 LABORATORY DATA, AIRBORNE ASBESTOS SAMPLING	

EXECUTIVE SUMMARY

The U.S. Army family housing units (FHUs) at Irwin, Pennsylvania were inspected by Roy F. Weston, Inc. (WESTON) personnel during March 1990 to further evaluate the environmental concerns identified in the enhanced Preliminary Assessment reports prepared and submitted earlier by Argonne National Laboratory (ANL) for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). Three of the 16 single-family "Capehart" housing units were examined on 02 March to investigate the possible presence of asbestos-containing materials (ACM). An assessment of airborne asbestos exposure was performed at one unit on this property on 17 April 1990 by a WESTON Certified Industrial Hygienist (CIH), because asbestos fibers were detected in the dust deposited within the ductwork of the heating system.

The ANL Draft Sampling and Analysis Plan, Revision 1 (SAP) specified sampling the following materials, where present, which are suspected to contain asbestos, from ten per cent of the housing units or a minimum of three housing units, whichever is greater.

- Pipe run insulation.
- Dust accumulated inside heating ductwork within the concrete slab, where present and open.
- Vinyl floor tiles.

The WESTON personnel selected three housing units for inspection after review of maintenance records and drawings, discussions with housing management personnel, and determination that the units were in similar condition. The housing units chosen, Nos. S-52, S-55, and S-56, were considered to be representative of the other 13 units, but this was not confirmed by an examination of all the units.

Twelve dust samples, 22 samples of floor tile and vinyl sheeting, and six samples of attic pipe run insulation were collected by WESTON and analyzed. These analyses revealed that asbestos is present in dust accumulated within the heating ductwork in floor tile and in pipe run insulation in the attic at the three housing units examined. Asbestos was found in 11 of the 12 dust samples by transmission electron microscopy (TEM) and in at least two samples from each unit. Asbestos was quantified at 1% or greater by polarized light microscopy (PLM) in 21 of the floor covering samples, and was qualitatively identified in one other sample by TEM. Asbestos was found at or greater than 3% in the six pipe run insulation samples by PLM. During the asbestos sampling activity, no other suspect materials were observed.

The following practices should be observed with regard to the known and suspected asbestos-containing materials identified:

- The friable asbestos-containing pipe run insulation in the attic is in an inaccessible area and may be left in place as long as it is not disturbed. However, an Operations and Maintenance (O&M) Plan must be developed and implemented. This plan must describe the locations of all known ACM, procedures for its maintenance, repair and removal, and personnel responsible for its implementation. The O&M program must remain in force until such time as all ACM is removed from the facility.

- The risks posed by the asbestos-containing dust in the ductwork cannot be clearly evaluated, because the sampling and analysis program only included a qualitative screening of this material since no approved quantitative procedure exists. Further studies, such as air sampling, were recommended to determine if the asbestos is becoming airborne and to define what risks, if any, are presented by these findings. These studies were subsequently performed and the findings are presented in this report.
- The vinyl floor tiles pose no significant risk as long as they are in good condition and are not damaged by excessive wear or misuse. They should be managed in place under an O&M program which describes procedures for the regular inspection of the floor coverings and the removal and replacement of any that become damaged.

Samples for airborne asbestos were collected from four floor vents, one located in each of the living room, kitchen, bedroom, and bathroom, in an unoccupied unit which had been inspected previously. The air samples were subjected to analysis by TEM to identify and quantify any asbestos fibers collected. The sample volumes collected resulted in detection limits for airborne asbestos fiber concentrations of <0.005 fibers per cubic centimeter (f/cc). No airborne asbestos fibers were detected at this FHU property, using sampling techniques designed to simulate worst-case concentration exposures.



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SECTION 1. INTRODUCTION

**SAMPLING AND ANALYSIS AT THE U.S. ARMY
FAMILY HOUSING UNIT (FHU) PROPERTY
IRWIN, PENNSYLVANIA**

SECTION 1. INTRODUCTION

Roy F. Weston, Inc. (WESTON) was retained by Argonne National Laboratory (ANL) to provide assistance in gathering additional environmental data for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) at 53 family housing unit (FHU) properties in 12 states. The Irwin, Pennsylvania property is one of these FHUs.

1.1 PURPOSE AND SCOPE

The purpose of this project was to provide the Department of the Army with sound environmental data on the properties which are scheduled for sale or realignment as a result of the Defense Authorization Amendments and Base Closure and Realignment Act (Public Law 100-526). Environmental assessments of each property covered by the Act are required by the Secretary of Defense prior to their closure or realignment. Such actions must be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA) to ensure that any environmental hazards will be identified and mitigated where required.

Previously, ANL conducted enhanced preliminary assessments (PAs) for each property. These enhanced PAs made recommendations regarding sampling and analysis to determine (1) whether and in what quantities asbestos is present in certain building construction materials (including pipe run insulation, dust accumulated in heating ductwork, vinyl floor tile, and exterior siding shingles, where present), (2) in selected contexts, whether and in what concentration soils and groundwater may be contaminated, and (3) whether and in what range transformer oils at selected sites may contain polychlorinated biphenyls (PCBs). WESTON gathered this data by implementing ANL's Draft FHU Sampling and Analysis Plan, Revision 1 (SAP). Subsequent to the initial studies, WESTON, ANL, and USATHAMA decided that a follow-up effort was required to determine if asbestos fibers were becoming airborne from the dust in the heating system. This study was implemented, and samples were collected to evaluate any risks to occupants from this source.

1.2 SITE DESCRIPTION

The Department of the Army's FHU property in Irwin, Pennsylvania consists of 16 single-family housing units located on 12.63 acres. The housing area is located 14 miles southeast of Pittsburgh and two miles northeast of Irwin.

The three-bedroom "Capehart"-style single-family housing units were constructed in 1958. The single-story, wood-frame units were built on concrete slab foundations with no basements or crawl spaces. The ducts for the original heating system and domestic water lines were embedded in the concrete slab, which was covered with vinyl floor covering. The units have pitched roofs surfaced with asphalt shingles and exteriors finished with wood siding.

1.3 REPORT ORGANIZATION

This report contains the results of the sampling and analysis program performed by WESTON. Section 2 contains a description of the asbestos sampling performed at the property and laboratory results for samples of suspected asbestos-containing material (ACM) collected. Copies of field notes and laboratory results pertaining to asbestos are provided in Appendices A.1 and A.2. Section 3 presents a description of the field sampling activities and results of the analyses for airborne asbestos fibers. Field notes and copies of the laboratory reports for this effort are presented in Appendices B.1 and B.2, respectively. Section 4 is a summation of all activities and findings for the Irwin FHU.

SECTION 2. ASBESTOS-CONTAINING MATERIALS

SECTION 2. ASBESTOS-CONTAINING MATERIALS

WESTON personnel inspected three of the 16 "Capelhart" units at the Irwin family housing facility on 02 March 1990 for the presence of suspected ACM. Vinyl floor tile, pipe run insulation, and dust accumulated within the heating ductwork were the only suspect materials found within the buildings that were sampled. All sampling was done following the requirements of ANL's SAP. Additionally, all field work was performed in accordance with applicable Federal regulations, including 40 CFR Part 61 Subpart M, 40 CFR Part 763 Subpart E, and 29 CFR Part 1910.1001.

2.1 SAMPLING RATIONALE

The sampling rationale used by WESTON for this project followed the recommendations set forth by ANL. The type of suspect ACM to be sampled, the number of housing units to be examined at each FHU facility, and number of samples to be taken for each material found were described in the SAP. The plan for Irwin required sampling of the following materials, if present:

- Pipe run insulation.
- Accumulated dust inside heating ductwork if not sealed.
- Vinyl floor tiles.

In accordance with the SAP, three units were examined at this facility. The sampling plan, however, did not identify specific units which were to be sampled. The task of determining which housing units were representative of the facility as a whole and, therefore, would be sampled was left to the WESTON field team. After reviewing all available maintenance records and drawings and discussing the facility with Directorate of Engineering and Housing (DEH) personnel, it was determined that all of the units at the Irwin FHU were similar in condition. Units S-52, S-55, and S-56 were chosen by the WESTON field team leader as representative units to be sampled.

The SAP specifies that a minimum of two pipe run insulation samples, four dust samples, and one sample of each color of floor tile be collected from each of the housing units examined. Twelve dust samples, six pipe run insulation samples, and 22 samples of vinyl floor tiles were collected at the facility.

2.2 FIELD ACTIVITIES AND OBSERVATIONS

Each of the units was inspected to determine if suspect materials were present. The samples of the pipe fitting insulation from the attic were retrieved using a disposable coring device with a one-half inch diameter tube, designed such that the coring device also serves as the sampling containers. Before the coring tool was inserted, the materials to be sampled were moistened to prevent asbestos fibers from becoming airborne. The coring device was placed in its outer sample container and secured by a tight fitting lid. The containers were labeled with sample numbers, and shipped to the lab. The sampling tools were wiped clean with a damp cloth and all debris resulting from the sampling activities as collected and placed into plastic bags. The small bore hole was sealed with an encapsulant.

Two samples of pipe run insulation were taken from the attic in each of the units. The pipe run insulation is friable, as defined in the EPA regulations, meaning that it can be crushed, crumbled, pulverized,

or otherwise reduced to a powder using hand pressure. Friable ACM is considered to be more hazardous than non-friable ACM since it is much more likely to release asbestos fibers. Because of its friability and instances of damage, the pipe run insulation is considered to be the most hazardous type of ACM in the Irwin FHU. However, its inaccessible location in the attic lessens the possibility of damage and exposure risk of the occupants.

Heating ductwork vents in the units were not sealed, so dust samples were collected by wiping the inner surface of the duct near the designated exhaust vents with a fiber-free wipe selected for its ability to trap dust in a non-fibrous matrix. Each wipe was placed in the jaws of a flexible small parts pick-up tool and moistened with fiber free water. The grille was then removed and the tool inserted into the duct opening. The interior surface was wiped to collect dust on the moistened surface of the wipe. After the dust was gathered, the wipe was placed in a small plastic wide-mouth jar, sealed, labeled with the sample number, and shipped to the lab. The grille was then replaced and the tool was cleaned by rinsing and wet wiping the surfaces prior to collecting the next sample. Samples were collected from the living room, bedroom, kitchen, and main bathroom in all three units.

Thirteen colors (brown, tan, light brown, dark brown, dark tan, red, gray, dark gray, black, white, light red, off-white, gray-green) of 9" x 9" vinyl floor tile and a brown 12" x 12" vinyl floor tile and a brown vinyl sheeting were sampled. Units S-52 and S-55 contained red, gray, dark gray, black, white 9" x 9" vinyl floor tile. Units S-55 and S-56 contained brown 9" x 9" floor tile. Unit S-56 contained tan, light brown, dark brown, dark tan 9" x 9" floor tiles, and brown pattern 12" x 12" floor tile. Unit S-55 contained light red, off-white, gray-green 9" x 9" floor tile. Unit S-52 also contained brown vinyl sheeting. One sample of each of the floor covering was taken in each housing unit, resulting in a total of 22 samples for laboratory determination of asbestos content. These samples were taken by breaking off a small piece of floor covering in an inconspicuous location. About one square inch of the tile surface area was taken for each sample. No effort was made to separate the mastic, which sometimes contains asbestos, from the floor covering samples themselves.

The vinyl floor covering in all three of the units inspected was in good condition. This material is considered to be a non-friable type of ACM, unless damaged. If significant damage occurs, such that the material becomes friable as defined in the asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), the U. S. Environmental Protection Agency (EPA) would classify these tiles as friable materials. However, an EPA interpretation was recently released that changes certain previous interpretations regarding non-friable ACM. On 23 February 1990, a memorandum was issued by the Director of Emissions Standards Division, the Director of Stationary Source Compliance Division, and the Associate Enforcement Counsel for Air Enforcement of the EPA Office of Air Quality Planning and Standards (OAQPS). This memorandum was circulated to other air quality officials and EPA regional offices in early March 1990. This latest position states that floor tiles and certain other non-friable materials do not have to be removed from a facility prior to demolition, unless they are severely damaged and thus are considered friable, or unless the demolition may cause fiber release through grinding or abrasion of the tiles. Floor tile removal shall be done if demolition is to be accomplished by burning, either of the unit or of the debris from demolition. However, if the floors in the housing units are to be renovated, special care must be taken during the process to prevent the release of asbestos fibers.

The WESTON field team was directed, as a part of the project scope contained in the SAP, to perform sampling and analysis of specific suspect ACM. No other suspect materials were observed. Copies of the field notes are included in Appendix A.1.

2.3 LABORATORY PROCEDURES AND RESULTS

The bulk samples of building materials were analyzed for asbestos content by WESTON's optical microscopy laboratory in Auburn, Alabama. This laboratory is accredited by the American Industrial Hygiene Association (AIHA) and the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). The bulk samples were analyzed by Polarized Light Microscopy (PLM) using the EPA's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/M4-82-020, December 1982. Copies of the laboratory reports are included in Appendix A.2.

Vinyl floor tile samples for which no asbestos was found using PLM methods and wipe samples of dust accumulated within heating ductwork were analyzed qualitatively for the presence of asbestos by Transmission Electron Microscopy (TEM) at WESTON's NVLAP accredited electron microscopy laboratory in Auburn, Alabama. Copies of these laboratory reports are also included in Appendix A.2.

All analyses were performed in accordance with protocols set forth in the Laboratory Accreditation package submitted by WESTON under NVLAP. This document includes standard procedures for sample analysis and quality assurance / quality control (QA/QC) which were acceptable to NIST. The QA/QC protocols for the laboratory differ significantly from those commonly found in chemical analysis procedures, due to the nature of the analytical procedure. Since there are no reagents, digestions, or other steps in the process that provide significant opportunities for sample contamination or analyte loss, lot blanks and sample spikes are not performed. Instead, all analyses are performed using the following steps:

- Incoming samples are divided into lots of ten for analysis.
- One sample is selected at random to serve as the QC check and divided into two containers.
- The sample lot is assigned to an analyst who determines the asbestos content of each sample.
- The QC sample is analyzed by a different analyst, designated by the sample custodian.
- The results of both analysts are submitted to the QC Coordinator for review, and comparison to the laboratory QC chart.
- The results are reviewed and approved, based on the written QC review procedures, or rejected. If rejected, the sample lot and QC sample are reanalyzed.

The WESTON laboratory routinely runs blank checks to ensure that equipment and refractive index oils are not contaminated, collects and analyzes samples of the air in the work areas to document that airborne asbestos fibers do not threaten worker health or contaminate samples, and analyzes samples submitted by NIST to document precision of results as required by the NVLAP program. Samples provided in past rounds of proficiency checks are used for analyst training and to document analyst proficiency. The use of third party

laboratory comparisons is often done, and is accomplished by sending duplicates of samples to an outside laboratory and comparing the results obtained by the two facilities.

In interpreting the asbestos results, it should be noted that the definition of asbestos presence differs between the EPA and some state agencies. According to the EPA definition, any materials that contain greater than one per cent (>1%) asbestos are classified as ACM by the 1977 NESHAP regulations. However, California has recently implemented state regulations that consider all materials containing 0.1 per cent or more asbestos as asbestos-containing. It is believed that several other states will soon follow the lead of California in lowering the threshold limit to 0.1 per cent, including some in which properties under review in this study are located. Currently the State of Pennsylvania continues to abide by the EPA definition, hence, all samples containing >1% asbestos are considered to be ACM.

The matter is further complicated by the fact that the PLM method was developed specifically for friable materials, but not for non-friable types of suspect ACM such as vinyl floor tiles, vinyl sheeting, and siding. In fact, no specific method has been developed and promulgated to date for such samples, so laboratories use PLM as the only available documented procedure for their analysis. PLM has an inherent limitation on fiber resolution of about 0.25 micrometer (um) in diameter, while reliable detection and quantification of fibers smaller than 1 um in diameter is difficult. The manufacturing process for vinyl floor tiles, for example, often produces the very small fiber diameters which cannot be seen by PLM. WESTON's experience is that frequently such samples do, in fact, contain significant quantities of asbestos. WESTON has developed a qualitative technique using TEM to detect the presence of such small fibers and minimize false negatives in the laboratory results. This technique, however, does not allow a good quantitative estimate of asbestos content.

For these reasons, the WESTON laboratories have implemented a policy of reporting asbestos presence as follows:

- Asbestos determined by PLM to be present at greater than 1% is reported as the quantity detected.
- If asbestos is estimated to be less than 1% by PLM, it is reported as "<1%". This estimate of asbestos content may be made when only one asbestos structure is observed.
- If asbestos is not detected in certain non-friable materials by PLM, then the samples are subjected to TEM analysis. The results are reported as positive if asbestos is detected by TEM.

Recommendations made in this report are based on the >1% regulatory limit, except for floor tiles as discussed earlier and except as otherwise noted. However, all samples in which asbestos was detected are discussed. This represents a conservative approach to the assessment of asbestos presence at the facility.

Table 2.1 contains a summary of all samples collected at the Irwin FHU, including sample locations, material descriptions, and laboratory results. PLM results are quantitative while TEM results are qualitative. Quantity estimates for materials sampled that were suspected to contain asbestos are presented in Table 2.2.

TABLE 2.1
BULK SAMPLE SUMMARY
IRWIN FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	ASBESTOS CONTENT PLM ANALYSIS	CONFIRMATION TEM ANALYSIS
=====				
Unit S55				

BU301-51-PA-S55-AFT	Red 9" x 9" floor tile	Kitchen	Chrysotile, 2%	
BU302-51-PA-S55-AFT	Lt red 9" x 9" floor tile	Kitchen	Chrysotile, 1%	
BU303-51-PA-S55-AFT	Black 9" x 9" floor tile	All bedrooms/Kitchen/ Living room/Hall	Chrysotile, 1%	
BU304-51-PA-S55-AFT	Off-white 9" x 9" floor tile	Living room/Bath 2/Hall	Chrysotile, 1%	
BU305-51-PA-S55-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2/Living room/Hall	Chrysotile, 1%	
BU306-51-PA-S55-AFT	Gray-green 9" x 9" floor tile	Living room/Hall	Chrysotile, 1%	
BU307-51-PA-S55-AFT	Dk gray 9" x 9" floor tile	Hall/Bath 2	Chrysotile, 2%	
BU308-51-PA-S55-AFT	Brown 9" x 9" floor tile	Hall	Chrysotile, 2%	
BU309-51-PA-S55-AFT	White 9" x 9" floor tile	Bath 1	Chrysotile, 1%	
BU310-51-PA-S55-ATD	Dust within ductwork	Living room	---	Positive
BU311-51-PA-S55-ATD	Dust within ductwork	Bath 1	---	Positive
BU312-51-PA-S55-ATD	Dust within ductwork	Bedroom 2	---	Positive
BU313-51-PA-S55-ATD	Dust within ductwork	Bedroom 3	---	Positive
BU314-51-PA-S55-AFT	Black 12" x 12" floor tile	Kitchen	Chrysotile, 1%	
BU327-51-PA-S55-API	Pipe run insulation	Attic	Chrysotile, 3%	
BU328-51-PA-S55-API	Pipe run insulation	Attic	Chrysotile, 5%	
Unit S52				

BU315-51-PA-S52-AFT	Brown vinyl sheeting	Kitchen	None Detected	Positive
BU316-51-PA-S52-AFT	Red 9" x 9" floor tile	Kitchen	Chrysotile, 1%	
BU317-51-PA-S52-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Hall/Living room	Chrysotile, 1%	
BU318-51-PA-S52-AFT	Dk gray 9" x 9" floor tile	Bath 1/Bedroom 1	Chrysotile, 1%	
BU319-51-PA-S52-AFT	Black 9" x 9" floor tile	All bedrooms/Bath 2/ Living room/Hall	Chrysotile, 1%	
BU320-51-PA-S52-AFT	White 9" x 9" floor tile	Bath 2/Hall	Chrysotile, 5%	
BU321-51-PA-S52-ATD	Dust within ductwork	Kitchen	---	Positive
BU322-51-PA-S52-ATD	Dust within ductwork	Living room	---	Positive
BU323-51-PA-S52-ATD	Dust within ductwork	Bath 2	---	Positive
BU324-51-PA-S52-ATD	Dust within ductwork	Bedroom 2	---	Negative
BU325-51-PA-S52-API	Pipe run insulation	Attic	Chrysotile, 5%	
BU326-51-PA-S52-API	Pipe run insulation	Attic	Chrysotile, 3%	

TABLE 2.1
BULK SAMPLE SUMMARY
IRWIN FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	ASBESTOS CONTENT PLM ANALYSIS	CONFIRMATION TEM ANALYSIS

Unit S56				

BU329-51-PA-S56-AFT	Brown 12" x 12" floor tile	Kitchen/Bedroom 1/ Bath 1/Bath 2	Chrysotile, 3%	
BU330-51-PA-S56-AFT	Brown 9" x 9" floor tile	Living room/Bedroom 2/ Bedroom 3/Hall	Chrysotile, 10%	
BU331-51-PA-S56-AFT	Tan 9" x 9" floor tile	Living room	Chrysotile, 1%	
BU332-51-PA-S56-AFT	Lt brown 9" x 9" floor tile	Living room	Chrysotile, 1%	
BU333-51-PA-S56-AFT	Dk brown 9" x 9" floor tile	All bedrooms/Hall/ Living room	Chrysotile, 1%	
BU334-51-PA-S56-AFT	Dk tan 9" x 9" floor tile	Hall	Chrysotile, 1%	
BU335-51-PA-S56-ATD	Dust within ductwork	Living room	---	Positive
BU336-51-PA-S56-ATD	Dust within ductwork	Kitchen	---	Positive
BU337-51-PA-S56-ATD	Dust within ductwork	Bath 2	---	Positive
BU338-51-PA-S56-ATD	Dust within ductwork	Bedroom 1	---	Positive
BU339-51-PA-S56-API	Pipe run insulation	Attic	Chrysotile, 5%	
BU340-51-PA-S56-API	Pipe run insulation	Attic	Chrysotile, 10%	

TABLE 2.2
ASBESTOS CONTAINING MATERIALS
IRWIN FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	QUANTITY	UNITS
=====				
Unit S55				

BU301-51-PA-S55-AFT	Red 9" x 9" floor tile	Kitchen	53	Square ft
BU302-51-PA-S55-AFT	Lt red 9" x 9" floor tile	Kitchen	2	Square ft
BU303-51-PA-S55-AFT	Black 9" x 9" floor tile	All bedrooms/Kitchen/ Living room/Hall	29	Square ft
BU304-51-PA-S55-AFT	Off-white 9" x 9" floor tile	Living room/Bath 2/Hall	23	Square ft
BU305-51-PA-S55-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Bath 2/Living room/Hall	732	Square ft
BU306-51-PA-S55-AFT	Gray-green 9" x 9" floor tile	Living room/Hall	43	Square ft
BU307-51-PA-S55-AFT	Dk gray 9" x 9" floor tile	Hall/Bath 2	13	Square ft
BU308-51-PA-S55-AFT	Brown 9" x 9" floor tile	Hall	11	Square ft
BU309-51-PA-S55-AFT	White 9" x 9" floor tile	Bath 1	3	Square ft
BU310-51-PA-S55-ATD	Dust within ductwork	Living room	N/A	
BU311-51-PA-S55-ATD	Dust within ductwork	Bath 1	N/A	
BU312-51-PA-S55-ATD	Dust within ductwork	Bedroom 2	N/A	
BU313-51-PA-S55-ATD	Dust within ductwork	Bedroom 3	N/A	
BU314-51-PA-S55-AFT	Black 12" x 12" floor tile	Kitchen	11	Square ft
BU327-51-PA-S55-API	Pipe run insulation	Attic	10	Linear ft
BU328-51-PA-S55-API	Pipe run insulation	Attic	10	Linear ft
Unit S52				

BU315-51-PA-S52-AFT	Brown vinyl sheeting	Kitchen	70	Square ft
BU316-51-PA-S52-AFT	Red 9" x 9" floor tile	Kitchen	70	Square ft
BU317-51-PA-S52-AFT	Gray 9" x 9" floor tile	All bedrooms/Bath 1/ Hall/Living room	795	Square ft
BU318-51-PA-S52-AFT	Dk gray 9" x 9" floor tile	Bath 1/Bedroom 1	3	Square ft
BU319-51-PA-S52-AFT	Black 9" x 9" floor tile	All bedrooms/Bath 2/ Living room/Hall	45	Square ft
BU320-51-PA-S52-AFT	White 9" x 9" floor tile	Bath 2/Hall	7	Square ft
BU321-51-PA-S52-ATD	Dust within ductwork	Kitchen	N/A	
BU322-51-PA-S52-ATD	Dust within ductwork	Living room	N/A	
BU323-51-PA-S52-ATD	Dust within ductwork	Bath 2	N/A	
BU325-51-PA-S52-API	Pipe run insulation	Attic	10	Linear ft
BU326-51-PA-S52-API	Pipe run insulation	Attic	10	Linear ft

TABLE 2.2
ASBESTOS CONTAINING MATERIALS
IRWIN FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	QUANTITY	UNITS
=====				
Unit S56				

BU329-51-PA-S56-AFT	Brown 12" x 12" floor tile	Kitchen/Bedroom 1/ Bath 1/Bath 2	259	Square ft
BU330-51-PA-S56-AFT	Brown 9" x 9" floor tile	Living room/Bedroom 2/ Bedroom 3/Hall	559	Square ft
BU331-51-PA-S56-AFT	Tan 9" x 9" floor tile	Living room	8	Square ft
BU332-51-PA-S56-AFT	Lt brown 9" x 9" floor tile	Living room	20	Square ft
BU333-51-PA-S56-AFT	Dk brown 9" x 9" floor tile	All bedrooms/Hall/ Living room	43	Square ft
BU334-51-PA-S56-AFT	Dk tan 9" x 9" floor tile	Hall	24	Square ft
BU335-51-PA-S56-ATD	Dust within ductwork	Living room	N/A	
BU336-51-PA-S56-ATD	Dust within ductwork	Kitchen	N/A	
BU337-51-PA-S56-ATD	Dust within ductwork	Bath 2	N/A	
BU338-51-PA-S56-ATD	Dust within ductwork	Bedroom 1	N/A	
BU339-51-PA-S56-API	Pipe run insulation	Attic	10	Linear ft
BU340-51-PA-S56-API	Pipe run insulation	Attic	10	Linear ft

The field notes describing the observations are provided in Appendix A.1, while copies of the original laboratory reports are included as Appendix A.2.

All six samples of pipe run insulation were found to contain the chrysotile type of asbestos in a friable form at concentrations at or greater than 3% using the PLM technique for analysis. Based on these observations, the pipe run insulations should be considered to contain asbestos.

Twenty-one of the floor covering samples were found by PLM to contain asbestos at or greater than the 1% level. WESTON considers the 1% value reported for Sample BU-302-51-PA-555-AFT and the 14 additional samples which contain this same amount to be sufficient to define the samples as asbestos-containing, due to the analytical uncertainty of the PLM method when applied to floor tiles, previously discussed. One sample, for which no asbestos was reported following PLM analysis, was found to contain asbestos fibers by the TEM procedure. While this result is qualitative in nature, consideration of the process through which floor tiles were manufactured leads to the conclusion that this material should be treated as ACM. Thus, all of the 22 floor covering samples were found to contain asbestos. The 13 units not inspected should be considered to have ACM present in the floor coverings unless additional sampling and analysis is performed and shows that no asbestos is present in these units.

Analytical results for the dust samples taken from the heater ductwork indicate that this dust contains some asbestos fibers. Qualitative TEM analyses revealed the presence of asbestos in 11 of the 12 dust samples. At least two samples from each unit had detectable asbestos fibers. This data lead to the conclusion that asbestos is found in the dust trapped by the heating ducts.

2.4 CONCLUSIONS AND RECOMMENDATIONS

The sample analyses performed by WESTON have revealed that asbestos is present in most floor tile samples collected in the three housing units examined, in pipe run insulation samples, and that the dust inside the heater supply ducts contains asbestos. These units are thought to be representative of the other 13 at the site, but this was not confirmed by sampling all units.

Analytical results of the pipe run insulation confirmed that asbestos is present in all six samples taken. This insulation is located in the attic above the ceiling, and may be left in place as long as the attic is not used for storage and the insulation is undisturbed. If the material is left in place, an O&M program should be developed and implemented. An O&M program must address the following:

- The locations of all known and suspected ACM.
- The procedures and frequency for periodically assessing the ACM in the facility.
- The procedures for safely handling the ACM during maintenance or removal activities.
- Designation of an asbestos coordinator for the facility.

- The responsibilities and requirements for training of personnel involved with maintenance and renovation of the facility.
- The record-keeping program for the facility.

All of the asbestos-containing pipe run insulation must be removed prior to a planned renovation of the plumbing system or demolition of the units.

The asbestos dust accumulated within the heating ductwork represents an unusual problem, since the source of this asbestos is not readily apparent, and the quantity is not precisely known. As a conservative approach, the heating ductwork located within the concrete slab should be cleaned or permanently sealed when the units are renovated. Since the heating systems are currently operational, sealing the floor vents will require replacement with attic ducts and ceiling vents, or provisions of an alternate heating source. If the ducts are cleaned, a high-powered vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter should be employed, since other vacuum cleaners are not capable of trapping all of the small asbestos fibers that may be present.

The source of the asbestos in the ducts cannot be positively determined, due to the sampling and analysis procedures employed. However, there are several potential sources, based on observations at the numerous facilities inspected during this project. Units, presumed to be the original heaters, found at other facilities frequently contained an expansion joint which served to isolate the return air plenum from the heater itself, preventing the transmission of vibrations and noise to the ductwork. The fabric-like material used to form this joint was determined, in some cases, to be chrysotile asbestos in a nearly pure form. It is possible, even likely, that the heating systems in these units had similar expansion joints which have been removed. During the 25 to 30 years that the original units were in service, erosion of these joints was likely, and could have caused asbestos fibers to accumulate in the dust.

Another possibility is that residual debris from the removal of vinyl-asbestos floor tiles, such as was found in other sites, may have been left in the ducts during floor tile removal and replacement. Conversations with the TEM analysis indicate that there was some evidence of chlorine observed during the identification of the asbestos fibers by X-ray dispersion analysis in samples from some sites. The most likely source of this element, considering the site history, is the vinyl chloride polymer which forms the floor tile matrix. However, other asbestos sources, such as debris imported into the facilities from outside activities of the occupants, cannot be ruled out.

The vinyl floor coverings in the three housing units inspected were in good condition, but, should they become broken or damaged, asbestos fibers may be released. The recent EPA clarification of the definition for damaged non-friable materials apparently removes some concerns about the status of these materials at the time of renovation or demolition. Inspection of these normally non-friable materials prior to demolition is required, but, if they are in good condition at the time, they may be left in place as long as planned demolition procedures will not release a significant amount of asbestos fibers. However, if demolition will subject these non-friable materials to grinding, sanding, or abrading, or if demolition involves burning of the structure or debris from the structure, all forms of ACM, including these floor tiles, must be removed in advance.

The vinyl floor coverings should be left in place and managed under an O&M program. The floor tiles should then be removed in accordance with regulations applicable at the time.

Although no other suspect materials were noted, care should be taken during renovations or demolition to identify suspect materials that may have been hidden from the view of the assessment team. Any hidden suspect materials found should be analyzed for the presence of asbestos prior to being disturbed.

SECTION 3. AIRBORNE ASBESTOS ASSESSMENT

SECTION 3. AIRBORNE ASBESTOS ASSESSMENT

Sampling for airborne asbestos fibers was performed at one unit of the Irwin, Pennsylvania FHU on 17 April 1990 by WESTON. Dr. Leonard Nelms, a Certified Industrial Hygienist (CIH) visited the site and collected the samples using procedures described in the Asbestos Hazard Emergency Response Act (AHERA). These procedures were designed for verifying that clean-up of a contained area, following completion of an asbestos abatement action in public schools, was adequately performed. All samples were analyzed by TEM following the protocols specified in AHERA.

3.1 SAMPLING RATIONALE

WESTON followed the procedures and guidelines set forth during discussions among ANL, USATHAMA, and WESTON staff members, to provide a fast-track field sampling program and rapid analysis of samples collected. The urgency of this effort was driven by the finding that asbestos fibers were a component of the dust contained in the sub-slab ductwork of a number of the installations. The approach chosen required that the WESTON CIH collect four samples of air from selected heating registers, generally from one vent in each of the living room, kitchen, bedroom, and bathroom.

Air samples were to be collected in one unoccupied unit at the site while the heating system was operating, to simulate the worst possible case for exposure of occupants. The vacant unit selected was to be one of those from which dust within ducts had been sampled during the initial investigations, where possible. If no unit that had been sampled previously was vacant at the time, another unit was to be chosen from among those available, and samples of dust from the ducts were to be collected. These samples were to be collected after completion of sampling for airborne fibers, using the procedures employed previously. Unit S-56 was selected at the Irwin site, since it was vacant and had previously been sampled.

3.2 FIELD ACTIVITIES AND OBSERVATIONS

The sampling activities at this site were performed during the evening, on a cool spring day. The diaphragm pumps were unpacked, placed in the selected sampling locations, and turned on as soon as possible after arrival at the site to allow the mechanical components to warm up prior to checking flow rates. Since there was no floor duct in the kitchen of this unit, a sample was taken from the second bedroom instead. The heating system was turned on as soon as the pumps were in operation, to allow the air flow to stabilize, since it had not been in operation recently.

A test filter cassette, identical to those used for sample collection, was placed on the pump system being calibrated and the airflow into the filter was measured using a calibrated rotameter. This followed AHERA requirements and good industrial hygiene (IH) sampling protocols. After the pumps were calibrated, a sampling cassette made of an electrically conducting plastic was attached to the sample line, placed directly over the heating register to be sampled, and securely held in place with duct tape. The cassette contained a 25 mm diameter mixed cellulose ester (MCE) membrane filter, having a nominal pore size of 0.45 μ m. The time at which sample collection was begun was recorded and the air was sampled for approximately three hours.

The pumps were operated for a length of time sufficient to draw about 1,600 liters (L) of air through each filter, based on the initial daily calibration. At the expiration of this time, the filter cassettes were removed from the heating register, inverted while the airflow continued, and lightly tapped to dislodge any fibers that may have adhered to the cowl of the cassette. Then, the cassettes were carefully removed from the sampling pump, resealed with the plugs and end caps that are a part of the cassettes, and labeled. The flow rate of each pump was again determined by exactly the same procedure used prior to the start of sample collection. After all sampling was completed, the heating system was returned to the same condition and setting that was found on entry to the unit.

The volume of air drawn through each filter was calculated, based on the average sample flow rate and the duration of sample collection, and recorded on the cassette label. Each cassette was then sealed in a anti-static plastic zipper-seal bag and placed in a shipping carton with a custom-designed anti-static foam liner. All sampling equipment, samples and other gear were then removed from the unit and the site was secured prior to departure.

Samples were collected from the four interior locations selected. In addition, a background sample of ambient outside air was taken near the entry door to the kitchen and a field blank was prepared. No significant problems were encountered during the sample collection activities.

During the sampling effort the facility was examined to identify any potential sources of asbestos that may be responsible for the asbestos fibers found in the dust. The heating ducts themselves are a cementitious material that may contain asbestos.

3.3 LABORATORY PROCEDURES AND RESULTS

Samples were shipped to the laboratory soon after collection by common carrier. The four samples of air from within the unit were analyzed by WESTON's NVLAP-accredited TEM facility, using the sample preparation and analytical procedures set forth in the EPA AHERA method. A section of the exposed filter was cut from each sample and three wedges were placed on copper wire grids for TEM mounting. The samples were etched in a plasma asher, which also destroyed some of the organic materials that may have been collected, and vacuum-coated with a thin layer of carbon, embedding the fibers that were on the filter surface. Each carbon-coated grid was placed in a Jaffe wick washer, in which the MCE filter matrix was dissolved and wicked away, leaving behind the carbon film containing any asbestos fibers collected. The grids were then examined and found to be ready for analysis.

Once the sample grids were prepared, each grid was examined by the TEM protocols of AHERA. A specified number of grid openings were scanned looking for fibers that may be asbestos. Typically, between six and ten grid openings had to be examined to comply with the detection limit of 0.005 fibers per cubic centimeter (f/cc) set forth in the regulations. Whenever a fiber was observed during this examination, the microscopist examined its morphology and determined its elemental composition from the emitted X-ray spectrum. If these indicated that it may be an asbestiform mineral, the crystal lattice structure was examined by observation of its electron diffraction pattern. The fiber was then classified either by the type of asbestos determined to be present during the analysis, or as a non-asbestos fiber.

The results for the four samples from inside Unit S-56 are presented in Table 3.1. No asbestos fibers were detected in any of these samples at a limit of detection that was between 0.004 and 0.005 fibers per cubic centimeter (f/cc). Based on these findings, the background sample and field blank were not examined, since no fibers were detected inside the unit.

3.4 CONCLUSIONS AND RECOMMENDATIONS

The air samples collected indicate that asbestos fibers from the dust found within the heating system ductwork are not being released in significant quantities at this facility. The airborne asbestos concentration was lower than the detection limit and below the AHERA threshold. The limits of detection were <0.005 f/cc, which is at or below the acceptability limit set forth in AHERA for clearance of an abatement area in a school, and were far lower than the OSHA Permissible Exposure Limit (PEL) for workers of 0.2 f/cc.

While asbestos has been shown to pose a health risk to humans at high fiber concentrations, there are no definitive studies that indicate that a risk is associated with low-level airborne exposures such as the 0.005 f/cc AHERA limit. Therefore, sampling and analysis for airborne asbestos at this site did not reveal any health risk to the occupants of the houses, based on the TEM analyses of the samples collected. However, it is recommended by the U.S. Army Environmental Hygiene Agency (AEHA) that, if the units are to remain under the management, operational control, or ownership of the Army, additional sampling and analysis for airborne asbestos be undertaken. These studies should be performed to provide data from at least ten percent or a minimum of three of the housing units, whichever is greater. This additional sampling and analysis effort, along with the other recommended actions, will help to ensure that there is no long-term exposure risk to the occupants or to maintenance personnel.

TABLE 3.1. RESULTS OF AIRBORNE ASBESTOS SAMPLING AND ANALYSIS
IRWIN, PENNSYLVANIA FAMILY HOUSING UNITS
(ALL VALUES IN FIBERS/CC)

SAMPLE NUMBER	SAMPLE LOCATION	ASBESTOS IN DUST	ASBESTOS CONCENTRATION	ASBESTOS TYPE FOUND
S-56-LR	Living Room	YES	ND <0.003	ND
S-56-KI	Kitchen	YES	ND <0.003	ND
S-56-BR	Bed Room	YES	ND <0.003	ND
S-56-BA	Bath Room	YES	ND <0.003	ND

ND = Not Detected at the Limit of Detection Cited.

Note: The asbestos in all dust samples was chrysotile.

SECTION 4. SUMMARY OF FINDINGS

Sampling and analyses performed at the Irwin, Pennsylvania FHU reveal the presence of issues of concern from an environmental standpoint. The most significant are the detection of asbestos in 11 of the 12 dust samples, in all six pipe insulation samples, and in all of the 22 samples of floor tile and vinyl sheeting collected.

The following practices should be observed with regard to the known and suspected asbestos-containing materials identified:

- While the general condition of the friable asbestos-containing pipe insulation in the attic is good and it is inaccessible, it can be damaged if disturbed or mishandled during maintenance activities. This material should be repaired if needed, encapsulated, and managed under an O&M Program as long as it remains in place. When removal of this material and replacement with an asbestos substitute is done, trained personnel should be utilized and state and Federal regulations must be followed.
- The vinyl floor coverings pose no significant risk as long as they are in good condition and are not damaged by excessive wear or misuse. They should be left in place and managed under an O&M program which describes procedures for the regular inspection of the floor coverings and the removal and replacement of any that become damaged.
- Additional sampling and analysis for airborne asbestos at this site is recommended by AEHA, if the units are to remain under the management, operational control, or ownership of the Army. These studies should be performed to provide data from at least ten percent or a minimum of three of the housing units, whichever is greater.

The air monitoring performed in Unit S-56 indicated that no detectable asbestos was being emitted to the air from dust collected in the heating ducts. The detection limit of the method, <0.003 f/cc, is below the AHERA limit and well below the OSHA PEL of 0.2 f/cc.

SECTION 4. SUMMARY OF FINDINGS

APPENDIX A.1. FIELD DATA, ASBESTOS SAMPLING

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01
FACILITY/BLDG. NO. Irwin Family Housing Unit 555
FACILITY CONTACT Sandy Ricketts TELEPHONE NUMBER 412 777-1221
TECHNICIAN NAME Michael Kindley SIGNATURE Michael Kindley
TECHNICIAN NAME Rob Egan SIGNATURE Rob Egan
TIME ARRIVED 1000 TIME DEPARTED 1050 DATE 02 Mar 90
dd mm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Arrived at Sandy Ricketts office at 0745. Left office at 0700 to drive to
Irwin. Arrived at 0750. The houses chosen by Sandy Ricketts, Housing
Manager, are those that are vacant, or whose occupants are at home
during the time that we are at a particular compound.
Unit 555 is a Capehart-style three bedroom unit, with wooden shingles
on outside walls, and tar shingles on the roof. The unit sits on a concrete
base. The inside is covered by vinyl flooring, with plaster board walls
and ceilings. All pipes observed in the unit are bare of insulation.
There are also no transite shingles on outside of unit.
^{10m}
~~At~~ These tile and four dust samples were taken in Unit 555. This
unit is currently vacant.
The areas for the closets are included with the areas for the rooms in
which the closets occur.
~~Check~~ Checked attic. No suspect material.
After ^{finding} ~~the~~ the suspect pipe insulation in Unit 552, we returned to Unit
555 and re-entered the Attic. We found the same type of aerosol
insulation on pipes. The pipes are covered by blown-in insulation and are

ACTIVITY CHECKLIST

Interviews Completed	<u>N</u>	Number of Samples	<u>16</u>
Drawings Reviewed	<u>N</u>	Survey Form Completed	<u>Yes</u>
Drawings Attached	<u>Yes</u>	Site Log Completed	<u>Yes</u>
Visual Inspection	<u>Yes</u>	Chain-of-Custody Initiated	<u>Yes</u>
Number of Photos	<u>2</u>	Exp. Assess. Form Init.	<u>Yes</u>
Q.A. Check <input checked="" type="checkbox"/>	SIGNATURE <u>Michael Skofnick</u>	DATE <u>21 MAR 90</u>	dd mm yy

SITE SURVEY LOG

(Continued)

impossible to see without digging thru the blown-in material.

ASBESTOS SURVEY DATA

07

BLDG. NO.: 51515
INSTALLATION 01511

TASK TEAM MEMBERS
Michael Kindley
Rolf Egan

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL

BLDG. NAME: Irwin Family Housing Unit 555
BLDG. DESCRIPTION: Cupboard

DATE (dd/mm/yy): 02/02/96
TIME ARRIVED: 10:00

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.
1.	B1031011-511-PIA-51515-A1F1T					KITCHEN	1513	-	1115110
2.	B1031012-511-PIA-51515-A1F1T					KITCHEN	1112	-	1115110
3.	B1031013-511-PIA-51515-A1F1T					KITCHEN	1145	-	1115110
4.	B1031014-511-PIA-51515-A1F1T					LIVING ROOM	1143	-	1115110
5.	B1031015-511-PIA-51515-A1F1T					LIVING ROOM	1132	-	1115110
6.	B1031016-511-PIA-51515-A1F1T					LIVING ROOM	1143	-	1115110
7.	B1031017-511-PIA-51515-A1F1T					HALL	1113	-	1115110
8.	B1031018-511-PIA-51515-A1F1T					HALL	1111	-	1115110
9.	B1031019-511-PIA-51515-A1F1T					BATH	1113	-	1115110
10.	B1031020-511-PIA-51515-A1F1T					LIVING ROOM	1111	-	1115110
11.	B1031021-511-PIA-51515-A1F1T					BATH	1111	-	1115110
12.	B1031022-511-PIA-51515-A1F1T					BEDROOM	1111	-	1115110
13.	B1031023-511-PIA-51515-A1F1T					BEDROOM	1111	-	1115110

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS. QUANTITY, ETC.
01	Red 9" x 9" floor tile
02	Light red 9" x 9" floor tile
03	Black 9" x 9" floor tile. Also occurs in Living Room, Bedroom 3, Bedroom 1, Bedroom 2, and Hall (in closet)
04	Off-white 7" x 9" floor tile. Also in Bath 2 and Hall
05	Gray 9" x 9" floor tile. Also in Bath 1, Bath 2, Bedroom 3, Bedroom 1, Bedroom 2, and Hall
06	Gray-green 7" x 9" floor tile. Also in Hall
07	Dark gray 9" x 9" floor tile. Also in Bath 2
08	Brown 7" x 9" floor tile
09	White 9" x 9" floor tile
10	Dust in dustwork

(continued on next page)

TECHNICIAN SIGNATURE Michael Kindley

QUALITY ASSURANCE SIGNATURE Michael Skotnicki

ASBESTOS SURVEY DATA (CONTINUED)

[illegible]

WESTON

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01
 FACILITY/BLDG. NO. Irwin Family Housing Unit 552
 FACILITY CONTACT Sandy R. Butler TELEPHONE NUMBER (412) 777-1231
 TECHNICIAN NAME Michael Skotnicki SIGNATURE Michael Skotnicki
 TECHNICIAN NAME Russ Egan SIGNATURE Russ Egan
 TIME ARRIVED 1055 TIME DEPARTED 1120 DATE 02 Mar 90
 dd mm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit 552 is a three bedroom Capehart-style structure with wooden shingles on outside walls and tar shingles on roof. The unit sits on a concrete base, and has vinyl flooring on inside, with plaster board walls and ceiling. There is no insulation in pipes observed. There is also no transite shingle on outside walls.

The areas for the closets are included with the rooms in which the closets occur.

6 floor tile samples and 4 duct samples were taken. Also two pipe run samples. Inspected the attic area. There is blown-in cellulose insulation (not sampled). Below the blown-in insulation were two 4" pipe runs covered by an insect-type insulation. Two samples were taken.

ACTIVITY CHECKLIST

Interviews Completed	<u>N</u>	Number of Samples	<u>12</u>
Drawings Reviewed	<u>N</u>	Survey Form Completed	<u>Yes</u>
Drawings Attached	<u>Yes</u>	Site Log Completed	<u>Yes</u>
Visual Inspection	<u>Yes</u>	Chain-of-Custody Initiated	<u>Yes</u>
Number of Photos	<u>2</u>	Exp. Assess. Form Init.	<u>Yes</u>
Q.A. Check <input checked="" type="checkbox"/>	SIGNATURE <u>Michael Skotnicki</u>	DATE <u>21 MAR 90</u>	dd mm yy

ASBESTOS SURVEY DATA

07

BLDG. NO.: 51512

INSTALLATION 01511

TASK TEAM MEMBERS

Michael Kindley

Rust Egan

W.O. No. 2104-13-01

CLIENT: ARGONNE NATIONAL

BLDG. NAME: Irwin Family Housing Unit S52

DATE (dd/mm/yy): 02/03/90

BLDG. DESCRIPTION: Cupchart

TIME ARRIVED: 1025

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	DO NOT	E.A. FORM NO.
1.	B1013115-511-PIA-S1512-A1F1T					KITCHEN	170		1151313
2.	B1013116-511-PIA-S1512-A1F1T					KITCHEN	170		1151314
3.	B1013117-511-PIA-S1512-A1F1T					HALL	1745		1151315
4.	B1013118-511-PIA-S1512-A1F1T					BATH	113		1151316
5.	B1013119-511-PIA-S1512-A1F1T					BATH	145		1151317
6.	B1013120-511-PIA-S1512-A1F1T					BATH	117		1151318
7.	B1013121-511-PIA-S1512-A1F1D					KITCHEN	111		111
8.	B1013122-511-PIA-S1512-A1F1D					LIVING ROOM	111		111
9.	B1013123-511-PIA-S1512-A1F1D					BATH	111		111
10.	B1013124-511-PIA-S1512-A1F1D					BEDROOM	111		111
11.	B1013125-511-PIA-S1512-A1F1E					BATH	110	Y	1151319
12.	B1013126-511-PIA-S1512-A1F1E					BATH	110	Y	1151320

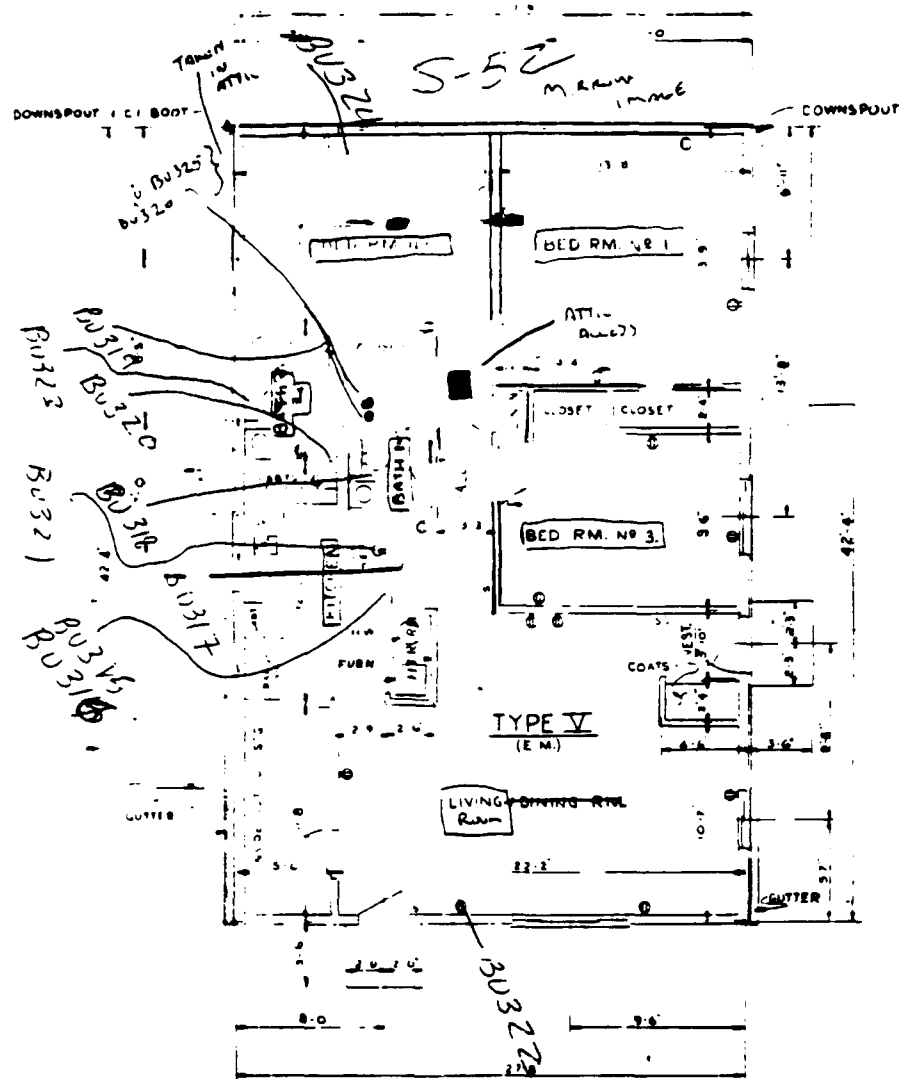
NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Brown rolled flooring (linoleum)
02	Red 9" x 9" floor tile. Lies under rolled flooring in Kitchen
03	Gray 9" x 9" floor tile. Also in Living Room, Bedroom 1, Bedroom 2, Bedroom 3, and Bath 1. Slightly damaged in Hall
04	Dark gray 9" x 9" floor tile. Also in Bedroom 1
05	Black 9" x 9" floor tile. Also in Living Room, Hall, Bedroom 1, Bedroom 2, Bedroom 3, and Hall. Mostly in closets
06	White 9" x 9" floor tile. Also in Hall
07	Dust in ductwork
08	Asbest-type insulation on pipe runs. Two runs frantically hit water and domestic water. Pipes are 4" in diameter. Lies under blown in insulation

TECHNICIAN SIGNATURE

Michael Kindley

QUALITY ASSURANCE SIGNATURE

Michael Skotnicki



Unit S-52
IRWIN S-52

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01
 FACILITY/BLDG. NO. Irwin Family Housing, Unit 556
 FACILITY CONTACT Sandy Ricketts TELEPHONE NUMBER (412) 777-1231
 TECHNICIAN NAME Michael Kindley SIGNATURE Michael Kindley
 TECHNICIAN NAME Rolf Erga SIGNATURE Rolf Erga
 TIME ARRIVED 1335 TIME DEPARTED 1430 DATE 02 Mar 90
 dd mm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit 556 is a three bedroom Capehart-style unit with wooden shingles on sides and tar shingles on roof. Inside has vinyl floor and plaster board walls and ceilings. The unit sits on a concrete pad. There are no occupants in Unit 556 at the moment.

All pipes observed in Hentler Rm. are bare. Also there are no transite shingles on the outside of the unit.

In attic there are two pipe lines insulated with urethane-type insulation. Pipes are covered by a non-suspicious blown-in insulation. It is impossible to see pipes without digging thru insulation.

Six floor tile samples, four dust samples, and two pipe can samples were taken.

The areas for the closets are included with the areas for the rooms in which the closets occur.

ACTIVITY CHECKLIST

Interviews Completed	<u>No</u>	Number of Samples	<u>12</u>
Drawings Reviewed	<u>No</u>	Survey Form Completed	<u>Yes</u>
Drawings Attached	<u>Yes</u>	Site Log Completed	<u>Yes</u>
Visual Inspection	<u>Yes</u>	Chain-of-Custody Initiated	<u>Yes</u>
Number of Photos	<u>2</u>	Exp. Assess. Form Init.	<u>Yes</u>
Q.A. Check <input checked="" type="checkbox"/>	SIGNATURE <u>Michael Skotnicki</u>	DATE <u>21 MAR/90</u>	dd mm yy

ASBESTOS SURVEY DATA

0803

BLDG. NO.: 1516

INSTALLATION 0511

TASK TEAM MEMBERS

Michael Kindley

Rita Erya

W.O. No. 2104-13-01

CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: Irwin Family Housing

DATE (dd/mm/yy): 02/03/90

BLDG. DESCRIPTION: Cupboard

TIME ARRIVED: 1332

ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	B101314	511	FIA	516	AIFIT	KITCHEN	254		111514F	011
2.	B101315	511	FIA	516	AIFIT	LIVING ROOM	1519		111515A	012
3.	B101316	511	FIA	516	AIFIT	LIVING ROOM	1118		111515B	013
4.	B101317	511	FIA	516	AIFIT	LIVING ROOM	1140		111515C	014
5.	B101318	511	FIA	516	AIFIT	HALL	1113		111515D	015
6.	B101319	511	FIA	516	AIFIT	HALL	1124		111515E	016
7.	B101320	511	FIA	516	AIFIT	LIVING ROOM	1117		111515F	017
8.	B101321	511	FIA	516	AIFIT	KITCHEN	1117		111515G	017
9.	B101322	511	FIA	516	AIFIT	BATH	1117		111515H	017
10.	B101323	511	FIA	516	AIFIT	BEDROOM	1117		111515I	017
11.	B101324	511	FIA	516	AIFIT	BATH	1110	Y	111515J	018
12.	B101325	511	FIA	516	AIFIT	BATH	1110	Y	111515K	018

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Brown patterned 12" x 12" floor tile. Also in Bedroom 1, Bath 1, and Bath 2.
02	Brown 9" x 9" floor tile. Also in Hall, Bedroom 3, and Bedroom 2.
03	Tan 9" x 9" floor tile.
04	Light brown 9" x 9" floor tile.
05	Dark brown 9" x 9" floor tile. Also in Living Room, Bedroom 3, Bedroom 1, and Bedroom 2. Occurs in closets.
06	Dark tan 9" x 9" floor tile.
07	Dust in ductwork.
08	Two pipes run in attic. Pipes are covered by an insull-type materials and lies under blown-in insulation. Quantity is in lining test and is estimated because of visibility restrictions.

TECHNICIAN
SIGNATURE

Michael Kindley

QUALITY ASSURANCE
SIGNATURE

Michael Skofnicki

APPENDIX A.2. LABORATORY DATA, ASBESTOS SAMPLES

BULK SAMPLE ANALYSIS SUMMARY

Weston W.O. No. 2104-13-01-0000

Sample Number BU301 through Sample BU340

AO LAB ID NO	CLIENT/CLIENT ID	LOCATION	MATERIAL DESCRIPTION *	DATE RECEIVED	RESULTS **					LAYERS	ANALYST
					CH	AM	CR	OT	TL		
BU301	51-PA-S55-AFT	KIT	NF, RD, 9X9 FT	03/06/90	2	ND	ND	ND	2	No	06806
BU302	51-PA-S55-AFT	KIT	NF, RD, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU303	51-PA-S55-AFT	KIT	NF, BK, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU304	51-PA-S55-AFT	LIV RM	NF, WH, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU305	51-PA-S55-AFT	LIV RM	NF, GY, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU306	51-PA-S55-AFT	LIV RM	NF, GY, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU307	51-PA-S55-AFT	HALL	NF, GY, 9X9 FT	03/06/90	2	ND	ND	ND	2	No	06806
BU308	51-PA-S55-AFT	HALL	NF, BR, 9X9 FT	03/06/90	2	ND	ND	ND	2	No	06806
BU309	51-PA-S55-AFT	BATH	NF, WH, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU314	51-PA-S55-AFT	KIT	NF, BK, 12X12 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU315	51-PA-S52-AFT	KIT	F, BR, LINOLEUM	03/06/90	ND	ND	ND	ND	ND	Yes	06806
BU316	51-PA-S52-AFT	KIT	NF, RD, 9X9 FT	03/06/90	1	ND	ND	ND	1	Yes	06806
BU317	51-PA-S52-AFT	HALL	NF, GY, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU318	51-PA-S52-AFT	BATH 1	NF, GY, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU319	51-PA-S52-AFT	BATH 2	NF, BK, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06072
BU320	51-PA-S52-AFT	BATH 2	NF, WH, 9X9 FT	03/06/90	5	ND	ND	ND	5	No	06072
BU325	51-PA-S52-API	ATTIC	F, PIPE RUN	03/06/90	5	ND	ND	ND	5	Yes	06072
BU326	51-PA-S52-API	ATTIC	F, PIPE RUN	03/06/90	3	ND	ND	ND	3	Yes	06072
BU327	51-PA-S55-API	ATTIC	F, PIPE RUN	03/06/90	3	ND	ND	ND	3	Yes	06072
BU328	51-PA-S55-API	ATTIC	F, PIPE RUN	03/06/90	5	ND	ND	ND	5	Yes	06072
BU329	51-PA-S56-AFT	KIT	NF, BR, 12X12 FT	03/06/90	3	ND	ND	ND	3	No	06072
BU330	51-PA-S56-AFT	LIV RM	NF, BR, 9X9 FT	03/06/90	10	ND	ND	ND	10	Yes	06072
BU331	51-PA-S56-AFT	LIV RM	NF, TN, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU332	51-PA-S56-AFT	LIV RM	NF, BR, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU333	51-PA-S56-AFT	HALL	NF, BR, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU334	51-PA-S56-AFT	HALL	NF, TN, 9X9 FT	03/06/90	1	ND	ND	ND	1	No	06806
BU339	51-PA-S56-API	ATTIC	F, PIPE RUN	03/06/90	5	ND	ND	ND	5	Yes	06806
BU340	51-PA-S56-API	ATTIC	F, PIPE RUN	03/06/90	10	ND	ND	ND	10	Yes	06806

MATERIAL DESCRIPTION	FRIABLE ¹	COLOR ²		SYSTEM ³
Friable ¹ , Color ² , System ³ , Type	F - Friable NF - Non-Friable	BK - Black BL - Blue BR - Brown GR - Green GY - Gray	RD - Red TN - Tan WH - White YL - Yellow	CHW - Chilled Water DOM - Domestic Water HHW - Heating Hot Water STM - Steam UNK - Unknown
RESULTS				
CH - Chrysotile AM - Amosite CR - Crocidolite	OT - Other TL - Total			

Upon issue, this report may be reproduced only in full.

All analyses are performed in accordance with the methods set forth in U.S. EPA 600/M4-82-020, as amended. Weston's Optical Microscopy Laboratory is accredited by the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program for asbestos fiber analysis (Laboratory Code 1254).



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1635 PUMPHREY AVE.
AUBURN, AL 36830
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**Transmission Electron Microscopy
Asbestos Summary Report**

Client: Argonne National Laboratories Weston W.O. No.: 2104-13-01-0000

Sample Type(s): Dust and Floor Tiles Sampling Location: Irwin

QUALITATIVE ANALYSIS

FLOOR TILES: A 0.5 to 2.0 gram portion of each floor tile sample was ultrasonically disaggregated in four milliliters of deionized, 0.2 μ m membrane filtered water. After the coarse fraction settled, a drop of the suspended, clay-sized fraction was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated for thermal stability in the electron beam and examined with a Philips CM12 transmission electron microscope operating at 120 kilovolts accelerating voltage.

DUST WIPE SAMPLES: A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated as above and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

ANALYTICAL RESULTS

SAMPLE IDENTIFICATION

RESULTS

BU310-51-PA-S55-ATD	Positive
BU311-51-PA-S55-ATD	Positive
BU312-51-PA-S55-ATD	Positive
BU313-51-PA-S55-ATD	Positive
BU315-51-PA-S52-AFT	Positive
BU321-51-PA-S52-ATD	Positive



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ANALYTICAL RESULTS
(continued)

SAMPLE IDENTIFICATION

RESULTS

BU322-51-PA-S52-ATD
BU323-51-PA-S52-ATD
BU324-51-PA-S52-ATD
BU335-51-PA-S56-ATD
BU336-51-PA-S56-ATD
BU337-51-PA-S56-ATD
BU338-51-PA-S56-ATD

Positive
Positive
Negative
Positive
Positive
Positive
Positive



(Approved for Transmittal)

3/29/90

(Date)

- * This test report relates only to the specific items tested.
- ** These sample results may only be reproduced in full, and are valid only if approved for transmittal.

APPENDIX B.1. FIELD DATA, AIRBORNE ASBESTOS SAMPLING

FIELD NOTES FOR IRWIN
UNIT S-43
17 APRIL 1990

The Irwin family housing unit is a three-bedroom slab-on-grade facility with wooden plywood exterior board finish. There is a tan with brown and white streaks 9"x9" floor tile in the living room. A light tan 9"x9" area with a medium tan 9"x9" also streaked with white pattern was noted in the living room, approximately three and a half by eight feet in size. The kitchen is done in a 12"x12" wood grain tile, that appears to be an imitation parquet of some type. At the entrance of the hallway, the tan 9"x9" like the primary tile in the living room continues but it is a slightly different shade and a different type of tile. The laundry facility on the left of the hall has a dark brown with orange streak 9"x9" tile. The half-bath has the same 12"x12" tile as was in the kitchen. There are replacement tiles in hallway at the half-bath. The small bedroom in the center front and the master bedroom in the far end rear continue with the same 9"x9" tan pattern that predominates in the living room. The other large bedroom on the front end corner has the same 12"x12" parquet type tile that was found in the kitchen. The closets in the bedrooms have the same dark brown tile that was found in the laundry room. This is true of all closets in the house except for the large pantry-type closet located adjacent to the kitchen. The full bath has the same 12"x12" wood grain that is found in the kitchen and one bedroom. The heater system in this unit is similar to the others, however it has no expansion joint material. Close examination did not show any evidence of such material as was found in all of the other Pittsburgh units examined to date. There appear to be no other issues and concerns at this facility.

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab ATC PROJECT NUMBER 21041-13-02
PROJECT LOCATION Irwin Unit S-56
WORK AREA ID NO. .. SAMPLE NO. S-56-LR

SAMPLE TYPE		
<input type="checkbox"/> PERSONNEL NAME _____ TASK _____	<input checked="" type="checkbox"/> AMBIENT <input type="checkbox"/> WORK AREA <input type="checkbox"/> ADJACENT ROOM <input type="checkbox"/> BACKGROUND <input checked="" type="checkbox"/> OTHER <u>Living Room Vent</u>	<input type="checkbox"/> CLEARANCE <input type="checkbox"/> INITIAL <input type="checkbox"/> FINAL REOCCUPANCY <input type="checkbox"/> OTHER _____ <input type="checkbox"/> TWA SAMPLE (SEE ADDITIONAL SHEETS)

SAMPLE DATA		
Filter area (FA), mm ² <input type="checkbox"/> 855 <input checked="" type="checkbox"/> 385	<div style="display: flex; justify-content: space-between;"> <u>1808</u> Time Began <u>2058</u> Time End <u>170</u> Sample Time </div>	<div style="display: flex; justify-content: space-between;"> <u>L. Nelms</u> Technician <u>17 Apr. 1990</u> Date </div>
PUMP ID. <u>70</u>	<div style="display: flex; justify-content: space-around;"> <div> <u>9</u> no </div> <div> <u>10.9</u> rate </div> <div> <u>10.6</u> Mean Flow l/min </div> </div>	
PUMP Cal Initial	<div style="display: flex; justify-content: space-around;"> <div> <u>10</u> no </div> <div> <u>10.4</u> rate </div> <div> <u>1870</u> Sample Vol. (VA) </div> </div>	

ANALYTICAL DATA

ANALYST _____

Scope ID _____	Microscopic Field Area (MFA) _____ mm ²
Date/Time Mounted _____	Date/Time Counted _____
Total Fibers Counted _____	Total Fields Counted _____
Average Count _____ /fld	Blank Count _____ /fld
Blank Corrected Count (BCC) _____	Fiber Density _____ /mm ²
Detection Limit (DL) _____ /cc	Concentration (C) _____ /cc

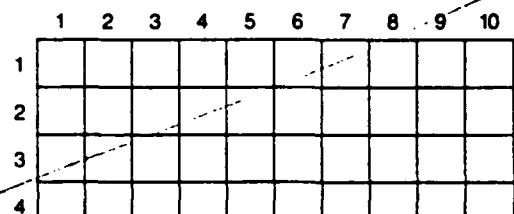
$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$


DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature

Date



NOTES/SKETCHES/REMARKS
<p>TFM</p> 

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab ATC PROJECT NUMBER 2104-13-02
 PROJECT LOCATION Irwin Unit S 56
 WORK AREA ID NO. _____ SAMPLE NO. S-56-KI

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☒ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☒ OTHER Kitchen Vent

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL, REOCCUPANCY

☐ OTHER

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 80

PUMP Cal Initial 9 10.3 10.0 L/min

PUMP Cal Final 10 9.8 1800
no. rate Sample Vol. (VA)

1805 2104 179 min
Time Began Time End Sample Time

L. Nelms 17 Apr. 1996
Technician Date

ANALYTICAL DATA

ANALYST _____

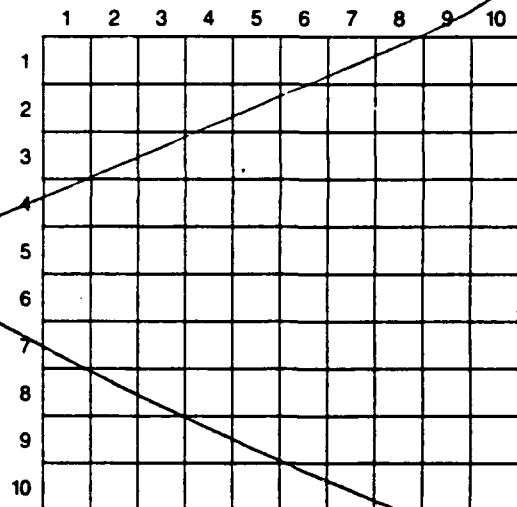
Scope ID _____ Microscopic Field Area (MFA) mm² _____
 Date/Time Mounted _____ Date/Time Counted _____
 Total Fibers Counted _____ Total Fields Counted _____
 Average Count 1/field _____ Blank Count 1/field _____
 Blank Corrected Count (BCC) 1/mm² _____ Fiber Density 1/cc _____
 Detection Limit (DL) 1/cc _____ Concentration (C) 1/cc _____

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

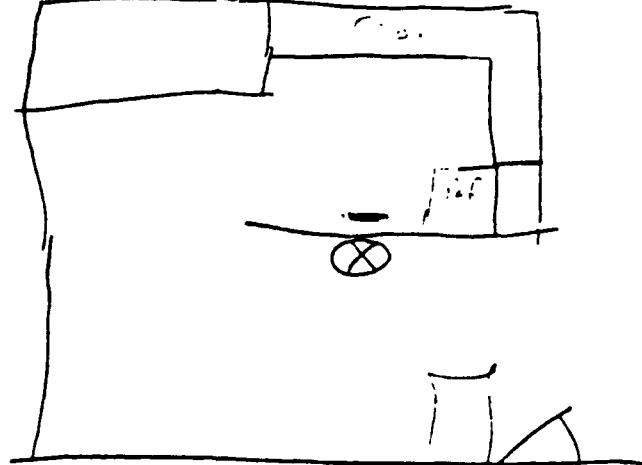
Signature _____ Date _____



NOTES/SKETCHES REMARKS

TEM

Brnd broke during sampling



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab. ATC PROJECT NUMBER 2104-13-02
 PROJECT LOCATION Irwin Unit 5-56
 WORK AREA ID NO. SAMPLE NO. 5-56-BR

SAMPLE TYPE

☐ PERSONNEL

NAME

TASK

☒ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☐ OTHER Bedroom Vent

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL, REOCCUPANCY

☐ OTHER

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 99

PUMP Cal Initial 9 9.5 7.4 L/min

PUMP Cal Final 10 9.3 1800 Sample Vol (VA)

1810 2122 17 Apr 1990
Time Began Time End Sample Time

L. Nelson 17 Apr 1990
Technician Date

ANALYTICAL DATA

ANALYST

 Scope ID Microscopic Field Area (MFA) mm²

 Date/Time Mounted Date/Time Counted

 Total Fibers Counted Total Fields Counted

 Average Count f/field Blank Count f/field

 Blank Corrected Count (BCC) Fiber Density 1/mm²

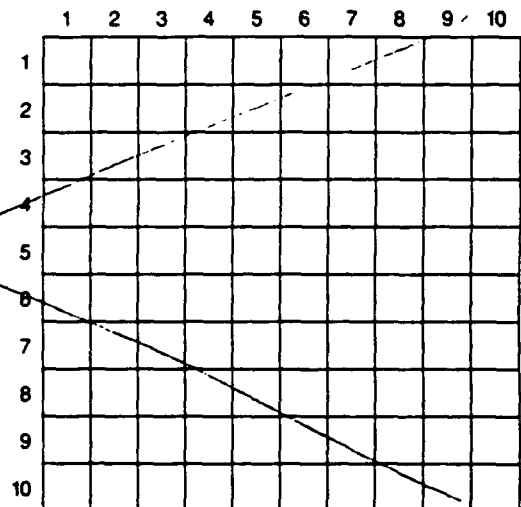
 Detection Limit (DL) f/cc Concentration (C) f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

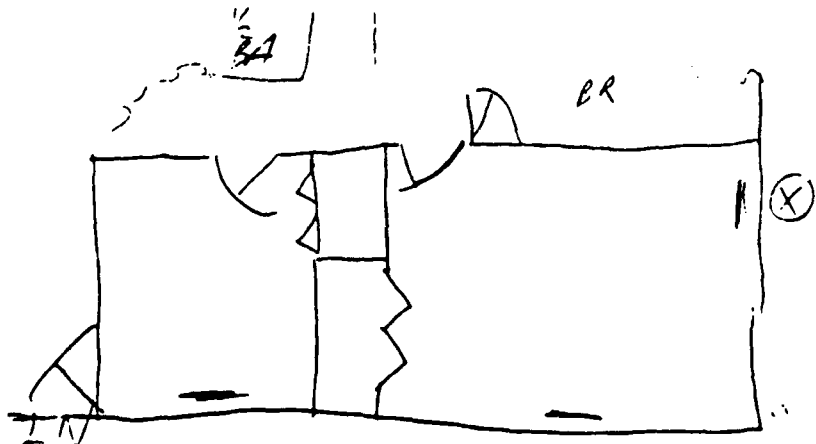
The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

 Signature Date



NOTES/SKETCHES REMARKS

TE m



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab ATC PROJECT NUMBER 2104-13-02
 PROJECT LOCATION Irwin Unit S-56
 WORK AREA ID NO. SAMPLE NO. S-56-BA

SAMPLE TYPE

☐ PERSONNEL

NAME

TASK

☒ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☐ OTHER Bathroom Vent

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL, REOCCUPANCY

☐ OTHER

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 97

PUMP Cal Initial 9 10.3 10.3 L/min
no. rate rate

PUMP Cal Final 10 10.3 1840
no. rate Sample Vol. (VA)

1813
Time Began

2112
Time End

179
Sample Time

L. Velms
Technician

17 Apr
Date

ANALYTICAL DATA

ANALYST

Scope ID

Microscopic Field Area (MFA) mm²

Date/Time Mounted

Date/Time Counted

Total Fibers Counted

Total Fields Counted

Average Count f/field

Blank Count f/field

Blank Corrected Count (BCC)

Fiber Density f/mm²

Detection Limit (DL) f/cc

Concentration (C) f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

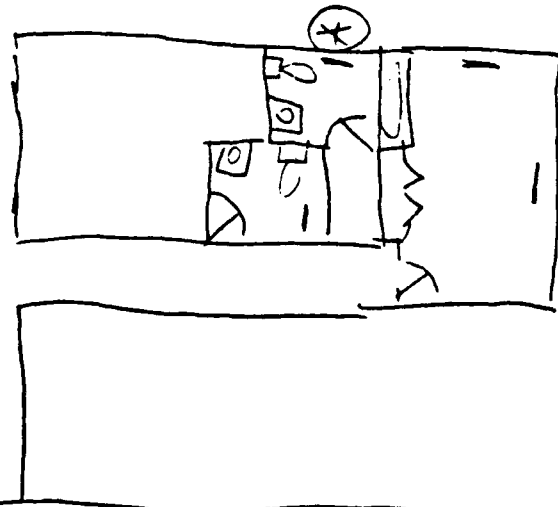
The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature Date

	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

NOTES/SKETCHES REMARKS

TEM



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab ATC PROJECT NUMBER 21641-13-02
 PROJECT LOCATION IRWIN Unit 5-56
 WORK AREA ID NO. - SAMPLE NO. S-56-0017

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☒ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☒ BACKGROUND

☐ OTHER _____

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL REOCCUPANCY

☐ OTHER _____

☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 78

PUMP Cal Initial 9 8.5 8.7 L/min
no rate Mean Flow

PUMP Cal Final 10 8.9 1360 L
no rate Sample Vol (VA)

18402 2135 214 min
Time Began Time End Sample Time
L Nelson 17 Apr 1990
Technician Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____ Microscopic Field Area (MFA) mm²

Date/Time Mounted _____ Date/Time Counted _____

Total Fibers Counted _____ Total Fields Counted _____

Average Count f/fg Blank Count f/fg

Blank Corrected Count (BCC) f/fg Fiber Density f/fg

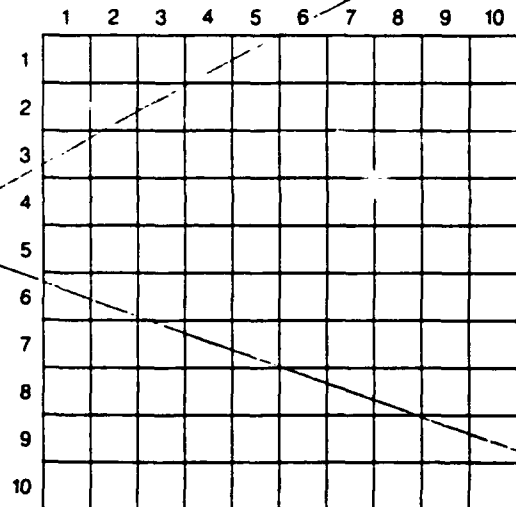
Detection Limit (DL) f/cc Concentration (C) f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____



NOTES/SKETCHES REMARKS

Tem

10, -chm window

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab ATC PROJECT NUMBER 2104-13-02
 PROJECT LOCATION Irwin Unit S-56
 WORK AREA ID NO. _____ SAMPLE NO. S-56-FB

SAMPLE TYPE

☐ PERSONNEL

NAME _____

TASK _____

☒ AMBIENT

☐ WORK AREA

☐ ADJACENT ROOM

☐ BACKGROUND

☒ OTHER Field Blank

☐ CLEAN ROOM

☐ AFD EXHAUST

☐ CLEARANCE

☐ INITIAL

☐ FINAL REOCCUPANCY

☐ OTHER _____

☐ TWA SAMPLE

(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm²

☐ 855

☒ 385

PUMP ID. NONE

PUMP Cal Initial N/A

PUMP Cal Final N/A

rate

Mean Flow

Sample Vol (VA)

1800

Time Began

2135

Time End

215

Sample Time

L. N. N. S.

Technician

17 Apr '90

Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____

Date/Time Mounted _____

Total Fibers Counted _____

Average Count 1/10

Blank Corrected Count (BCC) _____

Detection Limit (DL) 1/cc

Microscopic Field Area (MFA) mm²

Date/Time Counted _____

Total Fields Counted _____

Blank Count _____

Fiber Density 1/mm²

Concentration (C) _____

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____

Date _____

	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

NOTES/SKETCHES REMARKS

TEM

APPENDIX B.2. LABORATORY DATA, AIRBORNE ASBESTOS SAMPLING



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AUBURN, AL 36830
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FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-56-LR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE927

Received by: Barry Rayfield
Analyzed by: Barry Rayfield

Date Received: 04/19/90
Date Analyzed: 04/23/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm'
Sample Volume: 1810.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm'
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm'
Detection Limit: 0.003 fibers/cc
Grid Archive No.: 0225-E-4,5

ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		<u>Ambiguous</u>	<u>Non-Asbestos</u>
	<u><5μm</u>	<u>\geq5μm</u>	<u><5μm</u>	<u>\geq5μm</u>		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm')
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/mm')
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm')

Comments:

Barry Rayfield
(Approved for Transmittal)

April 25, 1990
(Date)

This test report relates only to the specific items tested.



ROY F. WESTON, INC.
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TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-56-BR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE928

Received by: Barry Rayfield
Analyzed by: Barry Rayfield

Date Received: 04/19/90
Date Analyzed: 04/23/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1800.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm²
Detection Limit: 0.003 fibers/cc
Grid Archive No.: 0225-A-8,9

ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		Ambiguous	Non-Asbestos
	<5 μ m	\geq 5 μ m	<5 μ m	\geq 5 μ m		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm²)
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/mm²)
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:


(Approved for Transmittal)

April 25, 1990
(Date)

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TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-56-KI

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE929

Received by: Barry Rayfield
Analyzed by: Greg Hall

Date Received: 04/19/90
Date Analyzed: 04/23/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1800.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm²
Detection Limit: 0.003 fibers/cc
Grid Archive No.: 0225-A-10,B-6

ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		<u>Ambiguous</u>	<u>Non-Asbestos</u>
	<u><5μm</u>	<u>\geq5μm</u>	<u><5μm</u>	<u>\geq5μm</u>		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm²)
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/mm²)
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:


(Approved for Transmittal)

April 25, 1990
(Date)

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TRANSMISSION ELECTRON MICROSCOPY
ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: S-56-BA

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE930

Received by: Barry Rayfield
Analyzed by: Barry Rayfield

Date Received: 04/19/90
Date Analyzed: 04/23/90

Filter Type: 0.45 μ m, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1840.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 7
Total Area Examined: 0.0616 mm²
Detection Limit: 0.003 fibers/cc
Grid Archive No.: 0225-B-8,9

ANALYTICAL RESULTS

	<u>Chrysotile</u>		<u>Amphiboles</u>		<u>Ambiguous</u>	<u>Non-Asbestos</u>
	<u><5μm</u>	<u>\geq5μm</u>	<u><5μm</u>	<u>\geq5μm</u>		
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/cc)
Concentration of Asbestos Structures < 5 μ m in length: ND (structures/mm²)
Concentration of Asbestos Structures \geq 5 μ m in length: ND (structures/mm²)
Total Concentration of Asbestos Structures ND (structures/cc)
Total Concentration of Asbestos Structures ND (structures/mm²)
Comments: A matrix with a non-emergent chrysotile fiber was identified.

Barry Rayfield
(Approved for Transmittal)

April 25, 1990
(Date)

This test report relates only to the specific items tested.